
Factors Protecting Against and Contributing to Food Insecurity Among Rural Families

Christine M. Olson, PhD, RD
Cornell University

Kendra Anderson, BS, RD
Cornell University

Elizabeth Kiss, PhD
Purdue University

Frances C. Lawrence, PhD
Louisiana State University Agricultural
Center

Sharon B. Seiling, PhD
The Ohio State University

The goal of this study was to understand better how the level of human resources and the diversion of financial resources away from food are related to the food security status of rural low-income households. A sample of 316 families with children and annual household incomes of less than 200 percent of the Federal poverty line was recruited from 24 rural counties in 14 States. For this study, face-to-face interviews were used to collect quantitative data. Results showed that the mothers who used a greater number of food and financial skills (managing bills, making a budget, stretching groceries, preparing meals) were more likely to have food-secure households, compared with the mothers who used fewer of these skills. Results also revealed that maternal symptoms of depression and reported difficulty paying for medical expenses were related to increased risk of food insecurity. The results are of interest to policymakers and program managers who address food security issues in rural areas of the United States.

Food insecurity and hunger of nationally representative samples of the U.S. population have been assessed annually since 1995 as part of the Current Population Survey (CPS). For the year ending September 2001, the prevalence of food insecurity in nonmetropolitan¹ households was 11.5 percent, compared with 7.7 percent in metropolitan households

¹Nonmetropolitan and metropolitan areas are defined by the Office of Management and Budget (OMB). In 2003, OMB defined metro areas as (1) central counties with one or more urbanized areas and (2) outlying counties that are economically tied to the core counties as measured by work commuting. Outlying counties are included if 25 percent of workers living in the county commute to the central counties or if 25 percent of the employment in the county consists of workers coming out from the central counties—the so-called “reverse” commuting pattern. Nonmetro counties are outside the boundaries of metro areas and are further subdivided into two types: micropolitan areas, centered on urban clusters of 10,000 or more persons and all remaining “noncore” counties (USDA, 2004).

outside central cities (Nord, Andrews, & Carlson, 2002). Nationally, 10.7 percent of all households (11.5 million) were food insecure during this period; 7.4 percent (8 million), food insecure without hunger; and 3.3 percent (3.5 million), food insecure with hunger. Food insecurity occurs “whenever the availability of nutritionally adequate and safe food or the ability to acquire acceptable foods in socially acceptable ways is limited or uncertain” (Anderson, 1990, p. 1560). Hunger, a narrower and more severe form of deprivation, is defined as “the painful or uneasy sensation caused by a lack of food” (Anderson, 1990, p. 1560).

Rural areas have some unique characteristics affecting food availability and acquisition that might contribute to the higher prevalence of food insecurity in nonmetropolitan areas—including the limited number of supermarkets, limited availability of food items, and high relative costs of food (Morris, Neuhauser, & Campbell, 1992). Thus, one might expect that families in rural areas

with greater skills in managing money and in accessing alternative food sources would be better able to meet their food needs and be more food secure than would be those with comparable incomes who lack these skills. Stronger and more geographically proximate extended family ties in rural areas might mitigate food insecurity. Lower costs of housing, typically the largest share of the family budget, might free more financial resources for food acquisition, thus decreasing food insecurity in rural areas.

In 1993, Rank and Hirschl showed that qualified families in rural areas were much less likely to participate in the Food Stamp Program than were urban families because of their negative attitudes toward welfare and lack of information about such programs. McConnell and Ohls (2002) reviewed survey and focus group data on participation in the Food Stamp Program by urban, suburban, and rural populations to determine whether particular barriers to program participation existed for rural households. These researchers found that a lack of understanding or awareness of eligibility was greater among rural food-stamp-eligible individuals, compared with their urban counterparts. Few investigators, however, have closely examined families' knowledge about community resources, including food assistance programs, as a factor protecting against food insecurity.

Using 1995-99 CPS data from non-metropolitan counties, Nord (2002) found no significant change in food insecurity and hunger across the period among low-income families (i.e., those with incomes that were less than 130 percent of the poverty level) receiving food stamps. But he did find that among low-income families not

receiving food stamps, food insecurity increased significantly: from 19.6 to 23.9 percent. This finding could indicate a protective effect that participation in the Food Stamp Program has against food insecurity in nonmetropolitan counties.

Previous research in a rural, upstate New York county showed that several household factors were related significantly to food insecurity: measures of wealth (i.e., having savings and owning a home), economic security and income-earning potential, financial resources for food acquisition (i.e., money to buy food), and access to "free" food from employers or Mother Nature (Olson, Rauschenbach, Frongillo, & Kendall, 1997). This previous research was not designed, however, to examine closely the key influences on food acquisition in Campbell's (1991) conceptualization of food insecurity and its risk factors: the human resources of households and the extent to which nonfood expenditures divert financial and human resources from food acquisition. Human capital theory (Becker, 1993) suggests that having human resources such as health, knowledge, and skills may protect against adverse outcomes such as food insecurity.

The research reported here explores the influence of two sets of factors on the food security status of a household: (1) the human resources of a household and (2) the diversion of financial resources from food acquisition. The goal is to identify characteristics of food-insecure rural households and household members.

Methods

Study Sample

The sample consisted of 316 rural low-income families from 24 counties in 14

States (fig. 1). These families participated in the first wave of the multi-State project, NC-223, "Rural Low-Income Families: Tracking Their Well-Being in the Context of Welfare Reform." Most of the counties (80 percent) had Rural-Urban Continuum Codes (RUCC 6, 7, or 8) (Butler & Beale, 1994). Codes 6 and 7 indicated they were nonmetropolitan with an urban population of 2,500 to 19,999. Code 8 counties were completely rural with no village of 2,500 or more people. Researchers in each State used the purposive selection method to choose one or two counties with these RUCCs. In several States, counties coded as 6, 7, or 8 were not available for study: In California, researchers chose two counties in the Central Valley that did not have a nearby urban center of more than 10,000 people. In New York and Massachusetts, researchers included the rural areas of one nonmetropolitan county with a RUCC of 4, which indicates an urban population of 20,000 to 50,000.

In each county, NC-223 researchers recruited families from programs that serve low-income people, for example, the Food Stamp Program, Head Start, the Supplemental Nutrition Program for Women, Infants, and Children (WIC), welfare-to-work programs, and migrant-worker programs. In almost all counties, educators in the Cooperative Extension Service assisted with recruiting participant families. To be eligible for participation in the study, families had to have annual household incomes at or below 200 percent of the Federal poverty line and at least one child 12 years old or younger. Within each county, families were selected purposively to represent the diversity in the types of families with children who would be affected by welfare reform. If two counties in each State were sampled, 15 families (a minimum) in each county were

bution of scores was skewed toward the higher end, this index was transformed into a categorical variable. Those subjects who reported being skilled in two or fewer of the four areas were classified as having a low skill level. Those who possessed three of the skills were classified as having a medium skill level, while those who were able to perform all of the skills were classified as being highly skilled.

Knowledge of community resources, a continuous variable in the form of a percentage, was the proportion of the 22-item section on knowledge of community resources that was answered affirmatively (Richards, 1998). The tool includes items such as, “Do you know how to find a family doctor?” and “Do you know how to apply for food stamps?”

Participation in the Food Stamp Program was used as a measure of a family’s participation in Federal food assistance programs because nearly all families were theoretically eligible. Participation was expressed as a simple binomial categorical variable. If the family received food stamps at the time of the interview, the family was considered a program participant. Participation in several other Federal food assistance programs with age restrictions and food stamp benefit level were also examined (e.g., the National School Lunch Program and WIC).

In addition to these four main predictors, we included other variables found to be associated with either food security status or one of the four primary predictors:

- Age of mother
- Self-reported race/ethnicity: non-Hispanic White, Hispanic/Latina, African American, and other
- Education: high school or less and more than high school

- Employment of mother: several measures including whether she was employed, whether the work was full- or part-time²
- Health insurance coverage: yes or no
- Type of insurance
- Housing situation: owning, renting, and other
- Problems paying for medical care: yes or no
- Annual household income expressed as percentage of the Federal poverty line: less than 100 percent, 100 to 130 percent, 130 to 185 percent, and greater than 185 percent.

We also included a measure for symptoms of depression and region of residence. The measure for symptoms of depression was the Center for Epidemiological Studies Depression Scale, used widely in population surveys and known as the CES-D (Radloff, 1977). The depression measure was expressed as a continuous variable, which was derived by summing the scores from 0 (rarely or none of the time) to 3 (most of the time) for the 20 items. Anyone with a score of 16 or higher was classified as being at risk for clinical depression. The scale had a Cronbach’s alpha of 0.89 in this sample. To account for the differences in the prevalence of food insecurity across States, we created a four-category variable to designate region of the country:

- East—Massachusetts, New Hampshire, and New York
- South—Kentucky, Louisiana, and Maryland
- Midwest—Indiana, Michigan, Minnesota, Nebraska, and Ohio
- West—California, Oregon, and Wyoming

²Employment status includes whether the mother was employed full- or part-time, the type of job, rate of pay, and number of hours worked per week.

The sample had a fairly high level of food and financial skills, with almost three-fourths (72 percent) classified as having the highest skill level and only about 10 percent classified as having a low skill level. The proportion in each group who were food insecure differed dramatically, 42 versus 83 percent, respectively.

Because we found a statistical interaction between education and ethnicity, a binomial variable with two categories was created: (1) all non-Hispanic Whites (regardless of educational level) plus minorities who did not have education beyond high school and (2) minorities who had education beyond high school.

Data Analysis

Simple tests of chi-square or difference of means were used to screen the many variables and to determine which were significantly associated with food security status at the $p \leq 0.10$ level. The result: We found that chronic health conditions, life skills, knowledge of community resources, and participation in the Food Stamp Program were each related to food security status. However, the amount of food stamp benefit and participation in other food assistance programs, such as WIC and free or reduced-price school lunch, were not significantly associated with food security status.

Next, we identified and evaluated variables that might confound the relationship of each of the four predictors to food security status. We defined a significant relationship to be anything with $p \leq 0.10$, and we retained the variable in the analysis. To maximize the likelihood of identifying and correctly modeling the confounding variables, we created four separate binary logistic regression models of food insecurity, one for each of the four main predictors, and examined all two-way interactions. We removed variables from each model based on their significance and effect on the Nagelkerke R^2 . We retained variables that were significant at the $p \leq 0.05$ level or were part of a significant interaction at the $p \leq 0.05$ level. These variables greatly increased the R^2 when included in the regression models.

Table 1. Mothers in rural low-income households: Characteristics of the sample, proportion food insecure, and risk of food insecurity, 2000

Risk factors and protectors	Characteristics	Food insecurity	
		Status	Risk
		<i>Percent</i>	<i>Odds ratio¹</i>
Mean chronic health conditions score ²			1.12
Greater than 1.98	-	54.2	-
Less than 1.98	-	44.1	-
Food and financial life skills			
Low	9.5	83.3	Reference group
Medium	18.4	58.6	0.23*
High	72.2	42.1	0.14**
Mean knowledge of community resources ²			0.70
Greater than 77.25	-	47.7	-
Less than 77.25	-	51.2	-
Participation in Food Stamp Program			
No	48.1	44.1	Reference group
Yes	51.9	53.7	1.12
Ethnicity			
Non-Hispanic White	69.9	53.8	Reference group
Hispanic/Latina or Latino	17.1	48.1	0.77
African American	7.3	17.4	0.44
Other	5.7	33.3	0.41
Education			
High school or less	57.6	55.0	Reference group
Education beyond high school	42.4	41.0	0.99
Ethnicity and education interaction			
White or non-White with high school or less	87.0	53.8	Reference group
Non-White with education beyond high school	13.0	17.1	0.17**

(continued)

Once we had an acceptable model of food insecurity for each of the four primary predictors, we combined the four models into one model. We modified this model in the same way we modified the individual models, as described earlier. In addition, we added the measure of household income (percentage of poverty level), which was not in any of the four individual models.

Results and Discussion

Overall, 49 percent of the 316 households in the sample were food insecure. The prevalence in this sample is comparable to the prevalence in the 1999 CPS sample of low-income nonmetropolitan households with children who were receiving food stamps (Nord, 2002). The majority of mothers in the households had one or more chronic health conditions, with only 23 percent reporting that they

Table 1 (continued). Mothers in rural low-income households: Characteristics of the sample, proportion food insecure, and risk of food insecurity, 2000

Risk factors and protectors	Characteristics	Food insecurity	
		Status	Risk
	<i>Percent</i>	<i>Percent</i>	<i>Odds ratio</i>
Housing status			
Own	19.9	33.3	Reference group
Rent	61.4	57.2	3.44**
Other	18.7	39.1	1.64
Problems paying for medical care			
No	72.2	42.5	Reference group
Yes	27.8	66.1	3.20**
Mean score on depression scale ²			1.03**
Greater than 17.36	-	60.4	-
Less than 17.36	-	40.1	-
Percent of poverty line			
<100%	63.9	50.0	Reference group
>100% and <130%	18.4	46.6	1.15
>130% and <185%	12.3	41.0	0.91
>185%	5.4	64.7	2.08
Region			
East	21.5	66.2	Reference group
South	20.3	34.4	0.28**
Midwest	35.1	46.0	0.50
West	23.1	50.7	0.63

¹Odds ratios determined from a single logistic regression model that included all the variables listed. The model had a Nagelkerke R² of 0.38 and 75 percent of cases classified correctly.

²For the continuous variables, the sample was divided at the mean, and the proportion of those above the mean who were food insecure is shown first followed by the proportion below the mean who were food insecure: 1.98 for chronic health conditions, 77.25 for knowledge of community resources, and 17.36 on the depression scale.

*p < 0.05.

** p < 0.01.

n = 316.

- not applicable.

had no chronic health conditions (data not shown). Households in which the mother had more than the mean number (1.98) of chronic health conditions were more likely to be food insecure than those with fewer health conditions (54 vs. 44 percent) (table 1).

The sample had a fairly high level of food and financial skills, with almost three-fourths (72 percent) classified as having the highest skill level and only about 10 percent classified as having a low skill level. The proportion in each

group who were food insecure differed dramatically, 42 versus 83 percent, respectively. Overall, this sample had a high level of knowledge about community resources, and the proportion who were food insecure did not differ greatly between those above and below the mean (77.25). Fifty-two percent of the sample participated in the Food Stamp Program at the time of the interview in 2000. Only 5 percent of the sample had household incomes greater than or equal to 185 percent of the Federal poverty line, but nearly

While the number of chronic health conditions was not a significant predictor of food insecurity in the multivariate model, two other health-related variables emerged as significant: having difficulty paying for medical expenses and symptoms of depression.

65 percent of this group was food insecure.

Food and financial skills and knowledge of community resources were each significantly protective against food insecurity ($p < 0.05$) in separate logistic regression models. Those with a high level of food and financial life skills were only one-eighth as likely to be food insecure, compared with those with a low level of skills. Receiving food stamps was protective against food insecurity, but the relationship was not significant ($p = 0.11$). The number of chronic health conditions was significantly and positively associated with increased risk of food insecurity ($p < 0.05$) (data not shown).

When all four primary predictors were considered in a single multivariate regression model, only food and financial skills remained statistically significant. While the number of chronic health conditions was not a significant predictor of food insecurity in the multivariate model, two other health-related variables emerged as significant: having difficulty paying for medical expenses and symptoms of depression. These results tend to indicate that it is the difficulty of paying for the medical care needed for chronic health conditions and the effect of these conditions on mental health that are related to food insecurity rather than the chronic health conditions themselves. This sample demonstrated a high prevalence of being at risk for clinical depression, with 60 percent scoring above the mean that was in the range of clinical depression (score ≥ 16).

In the multivariate regression model, only one significant interaction was found: Being non-White and having higher education emerged as a protective factor against food insecurity. Additionally, owning a home versus renting was a significant protective factor against food insecurity. The first

may be indicative of higher levels of human capital. The latter may be indicative of decreased diversion of financial resources away from food acquisition. Having difficulty paying for medical expenses, mentioned earlier, may also indicate a diversion of financial resources away from food acquisition. An unexpected finding was a significantly lower risk of food insecurity among research participants from the South.

Conclusions and Policy Implications

Food insecurity was common in this sample of rural low-income families with children residing in 14 different States across the United States. Nearly half of these families were food insecure, as measured by the USDA CPS food security survey questionnaire. After controlling for confounding factors, we found that families with the following characteristics were more likely to be food insecure:

- Lower levels of food and financial skills held by the mother
- Higher levels of depressive symptoms in the mother
- Difficulty paying for medical care
- Less than a high school education among non-White participants
- Not owning a home

These findings point to the importance of enhancing the human capital among the poor who reside in rural areas.

Formal and informal education in specific areas of life skills appear to be important avenues for promoting food security. The Expanded Food and Nutrition Education Program of the Cooperative State Research, Education, and Extension Service of the USDA and the Food Stamp Nutrition Education Program of the

Food and Nutrition Service of the USDA have the potential to affect the education of the rural poor through better targeting of the services and appropriate program adaptations to rural areas where the costs of operating such programs may be higher. Poor health, both physical and mental, is a major factor in the ecology of food insecurity in rural areas. The provision of health care at an affordable cost, for mental health problems and for physical disabilities, is central to promoting food security in rural areas of America. Coherent national and State-level health policies, including Medicaid, that recognize the unique nature of delivering comprehensive, quality health care in a rural environment are needed.

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